

RESEARCH ARTICLE**The Role of Generative AI in Enhancing English Communication Skills of Engineering Students: A Conceptual Review**

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Abstract:

Effective English communication is increasingly important for engineering students because professional engineering environments require graduates to communicate technical information through presentations, reports, discussions, interviews, meetings, and collaborative projects. However, many engineering students, particularly English as a Foreign Language (EFL) learners, experience difficulties in speaking fluently, writing accurately, participating in discussions, using appropriate technical vocabulary, and expressing ideas confidently. The emergence of Generative Artificial Intelligence (GenAI) has created new possibilities for supporting English communication development through personalized interaction, automated feedback, conversational practice, content generation, and language scaffolding. This conceptual review examines the role of Generative AI in enhancing the English communication skills of engineering students. It explores the potential contribution of GenAI to speaking, writing, vocabulary, listening, pronunciation, presentation skills, professional communication, and learner autonomy. The review also examines challenges associated with the use of GenAI, including inaccurate information, overdependence, reduced human interaction, academic integrity, privacy, and unequal access to technology. The paper argues that Generative AI can function as an effective supplementary tool for engineering English when integrated with task-based learning, project-based learning, teacher guidance, and authentic professional communication. A human-AI collaborative framework is proposed in which students use GenAI for practice, feedback, simulation, and language support while teachers provide contextual, disciplinary, ethical, and communicative guidance. The review concludes that responsible integration of Generative AI can help engineering students develop greater confidence, fluency, accuracy, and autonomy in English communication.

Keywords: Generative AI, engineering students, English communication, EFL, Artificial Intelligence, professional communication, language learning

1. Introduction

English communication skills are essential for engineering graduates in the contemporary global workplace. Engineers are expected not only to possess technical knowledge but also to communicate effectively with colleagues, clients, managers, researchers, and international teams.

Engineering students may need English for activities such as:

- technical presentations;
- project discussions;
- report writing;
- interviews;
- meetings;
- email communication;
- seminars;
- research publications;
- teamwork.

However, many engineering students focus primarily on technical subjects and may receive comparatively

RESEARCH ARTICLE

limited opportunities to develop communication skills. As a result, they may understand technical concepts but struggle to explain them confidently in English. Generative Artificial Intelligence has recently introduced new possibilities for language learning. AI systems capable of generating and responding to natural language can provide interactive communication practice, personalized explanations, writing assistance, vocabulary support, and simulated professional situations. This conceptual review examines the potential role of Generative AI in enhancing the English communication skills of engineering students.

2. Generative AI and English Language Learning

Generative AI refers to AI systems capable of producing new content in response to user instructions. In language education, these systems can generate:

- conversations;
- essays;
- dialogues;
- questions;
- summaries;
- vocabulary exercises;
- role-play scenarios;
- presentation scripts;
- grammar explanations;
- feedback.

For engineering students, GenAI can be particularly useful because learning activities can be connected to technical and professional contexts.

For example, students studying mechanical engineering can practise English through discussions about manufacturing, robotics, automobile technology, or renewable energy.

This contextualization can make language learning more meaningful.

3. Enhancing Speaking Skills

Speaking is one of the most important components of professional communication.

Generative AI can simulate conversations and provide opportunities for repeated speaking practice.

Students can use AI to practise:

- self-introductions;
- job interviews;
- group discussions;
- technical presentations;
- project explanations;
- workplace conversations.

For example, an AI system can act as an interviewer and ask engineering-related questions. The student can practise answering them and request feedback on clarity, vocabulary, grammar, and organization.

Repeated practice may improve confidence and reduce communication anxiety.

However, AI-based speaking practice should be supplemented by interaction with teachers and peers because authentic communication involves unpredictable responses, social cues, and interpersonal relationships

4. Improving Technical Vocabulary

Engineering students need specialized technical vocabulary.

GenAI can create personalized vocabulary exercises related to different engineering disciplines.

For example, civil engineering students can practise terms related to:

- structural design;
- construction;
- surveying;
- materials;
- transportation.

RESEARCH ARTICLE

Similarly, computer science students can practise vocabulary associated with:

- artificial intelligence;
- cloud computing;
- cybersecurity;
- databases;
- software development.

AI can provide definitions, examples, synonyms, quizzes, and contextual sentences.

This can help students develop both general English and discipline-specific vocabulary.

5. Supporting Academic and Technical Writing

Engineering students frequently produce laboratory reports, project reports, technical descriptions, research papers, and documentation.

GenAI can support writing development by helping students identify:

- grammatical errors;
- unclear sentences;
- inappropriate vocabulary;
- organizational problems;
- repetition;
- coherence issues.

Students can ask AI to provide feedback without requesting complete rewriting.

For example:

“Identify grammatical and organizational problems in this technical paragraph and explain how I can improve them.”

This encourages students to revise their own writing.

AI should therefore function as a writing support tool rather than a substitute for student authorship.

6. Presentation Skills

Engineering graduates frequently need to present technical information to different audiences.

GenAI can help students prepare presentations by generating:

- possible presentation structures;
- audience questions;
- technical discussion prompts;
- opening statements;
- transition expressions;
- presentation practice activities.

Students can also use AI to simulate audience questions after a presentation.

This can help them prepare for unexpected questions and improve their ability to explain technical concepts in accessible English.

7. Professional Communication

Engineering students require communication skills for workplace situations.

GenAI can simulate professional scenarios such as:

- writing formal emails;
- responding to clients;
- participating in meetings;
- explaining project delays;
- discussing technical problems;
- negotiating solutions;
- communicating with international colleagues.

Role-play activities can help students develop functional language and professional etiquette.

Such simulations are particularly useful when students have limited access to authentic workplace

RESEARCH ARTICLE

environments.

8. Listening and Conversational Practice

Generative AI can also support listening and conversational learning when combined with speech-enabled systems.

Students can participate in simulated conversations and practise responding to questions.

For example, an AI system can simulate a technical meeting in which the student must explain project progress.

Such activities can improve learners' ability to process questions and formulate appropriate responses. Nevertheless, authentic listening materials involving different accents, speaking speeds, and communication styles should continue to be included in engineering English courses.

9. Personalized Learning and Learner Autonomy

Engineering students differ in their communication needs.

Some may require support in speaking, while others may need assistance with writing, pronunciation, vocabulary, or presentations.

GenAI can provide personalized learning activities based on individual needs.

Students can also practise independently outside classroom hours.

This may increase learner autonomy and allow students to take greater responsibility for their communication development.

However, autonomous use requires critical AI literacy. Students need to evaluate AI responses and recognize that generated content may not always be accurate.

10. Challenges and Limitations

Despite its potential, GenAI presents several challenges.

Accuracy

AI-generated information can sometimes be incorrect or misleading.

Overdependence

Students may become dependent on AI for communication instead of developing independent language skills.

Reduced Human Interaction

Communication involves empathy, body language, cultural understanding, and interpersonal relationships that AI cannot completely reproduce.

Academic Integrity

Students may use AI to produce reports or assignments without demonstrating their own abilities.

Privacy

Student writing, voice recordings, and personal information may raise data privacy concerns.

Technical Access

Not all students have equal access to reliable internet services and advanced AI tools.

These issues must be considered when integrating GenAI into engineering education.

11. Role of Teachers

Teachers remain central to effective communication education.

They can design activities, establish learning objectives, evaluate AI-generated content, provide contextual feedback, and create opportunities for authentic interaction.

Teachers can also teach students how to formulate effective prompts and critically evaluate AI responses.

A blended classroom can therefore combine:

Teacher instruction + AI practice + Peer interaction + Authentic communication

This approach can provide greater educational value than relying on any single method.

12. Human-AI Collaborative Framework

A practical framework for engineering communication can involve five stages:

1. Identify Communication Need: Determine whether the learner needs support in speaking, writing, vocabulary, pronunciation, or presentation.

RESEARCH ARTICLE

2. AI-Supported Practice: Use GenAI to generate customized activities.

3. Feedback and Reflection: Students examine AI feedback and identify areas for improvement.

4. Human Interaction: Students apply their skills in presentations, discussions, role plays, and project activities.

5. Performance Evaluation: Teachers assess communication performance and provide individualized guidance.

This framework maintains student responsibility while using AI as a learning assistant.

13. Pedagogical Implications

GenAI can be integrated into engineering English courses through task-based and project-based activities.

For example, students can be asked to develop a technical project proposal. They can use AI to brainstorm vocabulary and practise presentation questions but must independently prepare the final proposal and presentation.

Similarly, students can conduct simulated job interviews with AI before participating in teacher-led mock interviews.

These activities connect English learning with professional engineering contexts.

14. Future Research

Future research should empirically examine the effectiveness of GenAI in engineering English education.

Studies can investigate:

- speaking fluency;
- writing accuracy;
- technical vocabulary;
- pronunciation;
- presentation performance;
- communication confidence;
- learner motivation;
- learner autonomy.

Researchers should compare conventional communication instruction with AI-supported and blended approaches.

Longitudinal research is also required to determine whether improvements achieved through GenAI transfer to authentic workplace communication.

15. Conclusion

Generative AI represents a promising development in English communication education for engineering students. Its ability to generate personalized language activities, simulate professional conversations, provide writing feedback, support technical vocabulary, and facilitate repeated practice can help engineering students develop communication skills relevant to academic and professional contexts.

The greatest value of GenAI lies in its capacity to provide additional opportunities for practice and feedback beyond traditional classroom limitations. Engineering students can use AI to rehearse interviews, presentations, meetings, technical explanations, and professional conversations.

However, GenAI should not replace teachers, peers, or authentic communication. Inaccurate information, excessive dependence, academic integrity concerns, privacy issues, and reduced human interaction must be addressed through appropriate institutional and pedagogical practices.

A human-AI collaborative approach is therefore recommended. Students should use GenAI as a practice and feedback partner while teachers provide disciplinary knowledge, communicative guidance, ethical instruction, and authentic interaction.

When responsibly integrated into engineering education, Generative AI can contribute to improved English communication, greater learner confidence, stronger professional readiness, and increased autonomy. The

RESEARCH ARTICLE

future of engineering English education should therefore focus on using AI not simply to generate language, but to **create more opportunities for students to practise, communicate, reflect, and become confident professional engineers.**

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